A Robust Group Communication Paradigm

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Communication over the network is the life blood of collaborative applications. To date, the primary communication mechanisms available have been unicast (point-to-point) and multicast.. The unicast mechanisms of UDP (unreliable), TCP (reliable), and SSL/TLS (secure) are now relatively robust and standard in most operating systems and networks. Multicast is also now widely available but only for unreliable message transmission and many networks still have configuration problems. Ideally collaborative applications need an ability to communicate reliably among a group of processes. This mechanism needs to be robust and support secure communication when needed.

There are several basic properties needed in this communication capability. These include: self-configuring, robust, support for variable bandwidth connections, efficient, reliable, and able to limit membership. We believe that overlay networks can provide all of these properties effectively. There are several key emerging technologies that can be employed in the overlay network. For example, reliable group communication can provide efficient communication to areas of the network that support multicast capabilities. Unicast distribution trees can augment the multicast capabilities and provide translation points for changing between high and low bandwidth capabilities. Network monitoring can provide support for configuration of the overlay and testing tools to monitor whether multicast or unicast connectivity should be used between pairs of sites.